

as well as any other, were it not that common sense teaches that nothing can be spontaneously evolved out of that in which it did not previously exist.

There is one other unsolved problem in the study of life by the geologist to which it is still necessary to advert. This is the inability of palaeontology to fill up the gaps in the chain of being. In this respect we are constantly taunted with the imperfection of the record; but facts show that this is much more complete than is generally supposed. Over long periods of time and many lines of being we have a nearly continuous chain, and if this does not show the tendency desired, the fault is as likely to be in the theory as in the record. On the other hand, the abrupt and simultaneous appearance of new types in many specific and generic forms and over wide and separate areas at one and the same time, is too often repeated to be accidental. Hence palaeontologists in endeavoring to establish evolution, have been obliged to assume periods of exceptional activity in the introduction of species alternating with others of stagnation, a doctrine differing very little from that of special creation as held by the older geologists.

The attempt has lately been made to account for these breaks by the assumption that the geological record relates only to periods of submergence and gives no information as to those of elevation. This is manifestly untrue. In so far as marine life is concerned, the periods of submergence are those in which new forms abound for very obvious reasons already hinted; but the periods of new forms of land and fresh-water life are those of elevation, and these have their own records and monuments, often very rich and ample, as for example the swamps of the Carboniferous, the transition from the Cretaceous subsidence to the Laramie elevation, the Tertiary lake-basins of the west, the Terraces and raised beaches of the Pleistocene. Had I time to refer in detail to the breaks in the continuity of life which cannot be explained by the imperfection of the record, I could show at least that nature in this case does advance *per saltum* — by leaps, rather than by a slow continuous process. Many able reasoners, as Le Conte in this country, and Mivart and Collard in England, hold this view.

Here, as elsewhere, a vast amount of steady conscientious work is required to enable us to solve the problems of the history of life. But if so, the more the hope for the patient student and in-